

1. INTRODUCTION

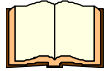
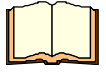
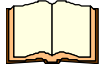
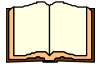
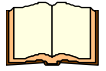
The Navy Cost of Manpower Estimating Tool (COMET) was developed to enable defense contractors and Navy cost analysts to accurately and consistently estimate personnel-related costs associated with the acquisition process. The program allows users to view the direct and variable indirect costs associated with an individual and also, to view final variable costs for specific skill groups. Users can view all-Navy costs as well as occupation-specific costs. With this capability, system developers and project officers are able to assess the economic impact on life cycle costs of hardware/manpower tradeoff alternatives.

The COMET program is a Windows95 program. The data files are quite robust, and considerable experimentation is possible with no danger of corrupting the underlying cost data. From the user's point of view, COMET is divided into three functional parts: (1) individual billet data, (2) final cost file creation/modification, and (3) life cycle cost modeling. Individual billet data may be viewed down to the level of specific variable costs by selecting a rating or designator. Individual average costs per pay grade may be viewed as well. Final cost file creation/modification allows the user to create a final cost estimate using assumptions other than the COMET defaults. These files are then available as cost "building blocks" and are used by analysts in creating a variety of costing scenarios.

For example, a user may wish to create a final cost file containing the costs of each rating/designator in the Navy, modified to assume everyone receives sea pay. This final cost file may be used in identifying the manpower costs associated with a new missile launching platform on a destroyer escort. Even though the specific training costs may not yet be available, one could find a similar course for the FC rating and the GMM rating and add these amounts to the appropriate pay grades. With this data, the user could speculate on the manpower costs of a new long-range vertical launch missile system, which may require the additional assignment to the ship of a lieutenant (jg), one Gunners Mate chief, a first class Gunners Mate, a first class Fire Controlman, and so on. Once the manning cost of billets are established for this platform, the user may create a similar platform with variations and add them together in a squadron or build the requirements for a whole new ship, including this platform. By drafting the manning expectations of existing or future units in this fashion, the costs of manpower may be accurately assessed.

1.1 COMET PROGRAM DOCUMENTATION

There are separate cost estimation modules for the Navy's Active Duty, Reserve, and Civilian components. Since each component has both an *Operations Manual* and a *User's Manual*, the entire COMET Program documentation set encompasses six manuals, as shown below:

Active Component:*Active Component Operations Manual (this document)**Active Component User's Manual***Reserve Component:***Reserve Component Operations Manual**Reserve Component User's Manual***Civilian (Government employees) Component:***Civilian Component Operations Manual**Civilian Component User's Manual*

1.2 PURPOSE OF THIS MANUAL

This manual, intended for use as a precursor to the *Active Component User's Manual*, describes data flows, algorithms, and processes used in calculating costs for COMET. Readers of this manual will better understand how the model works, under what circumstances the model is used, and the methodology and data sources used in the model. By reviewing this information prior to using the model, the user will be equipped to use the model appropriately. It is intended to provide enough information to allow for updates of the various cost modules and permit critique through full disclosure of underlying assumptions, by explaining how the equations associated with the different cost modules are derived. It also provides information on data sources.

Please contact SAG Corporation (703-538-4500) for further information, if necessary.

1.3 SKILL IDENTIFIERS

Enlisted personnel standard rating nomenclature is supplemented with some Enlisted Management Communities (EMC). This was done to break out certain communities that have costs and functions that make them unique. For instance, all ratings that contain submarine personnel have the submarine EMC underneath the main rating.

Although each EMC is a subset of a rating, not all of the subsets have been included. Because of the way EMCs are designed, that would be impossible. Therefore, one cannot add up the costs associated with the EMCs under one particular rating and expect them to match the rating's costs. A rating's costs include the costs of the EMCs. Appendix B contains a list of the ratings/EMCs used, as well as the officer designators.

1.4 ORGANIZATION OF THIS MANUAL

The remainder of this manual is organized as follows:

- Section 2 presents a listing of the notation used both in the software and in the cost modules.
- Section 3 provides specific information for each module.
- Section 4 explains the amortization techniques used.
- Appendix A provides the data sources for each variable.
- Appendix B contains a list of the job categories used.

2.COMET NOTATION

This section presents the notation used in discussions of the individual policy modules. All costs are annual costs. In addition to the notation linked to each policy module, the following is global notation.

AC	= Average Cost
MC	= Marginal Cost
I	= Index of length of service
j	= Index of pay grade
k	= Index Rating/Designator
E	= Total member inventory

2.1 MILITARY COMPENSATION

AC_{jk}^{bp}	Average cost of basic pay paid to members in grade j and rating k
bp_{ij}	Basic pay for an individual member in LOS i and grade j
E_{ijk}	Inventory of members in LOS i, grade j and rating k
AC_{jk}^{baq1}	Average BAQ for grade j, rating k assuming all members receive BAQ in cash
$w_dep\%_{jk}$	% of members in grade j, rating k with dependents
$bq1_j$	Rate of BAQ for members drawing w/dependents in grade j
$bq2_j$	Rate of BAQ for members drawing w/o dependents in grade j
$bq3_j$	Rate of partial BAQ for members without dependents in grade j
m_kind_{jk}	% of members with dependents drawing BAQ-in-kind by grade and rating
s_kind_{jk}	% of members without dependents drawing BAQ-in-kind by grade and rating
m_cash_j	% of members with dependents drawing BAQ-in-cash by grade
s_cash_j	% of members without dependents drawing BAQ-in-cash by grade
AC_{jk}^{baq2}	Average BAQ for grade j, rating k assuming some members receive BAQ-in-kind
AC_{jk}^{vha2}	Average VHA for grade j assuming some members receive BAQ/VHA-in-kind
$fract_vha_{jk}$	Fraction of those receiving VHA by grade and rating
vha_yr_{jk}	Average VHA yearly rate for members in grade j, rating k who do not live in government quarters
AC^{bas}	Average amount of BAS received

AC_{ik}^{mc}	Average annual compensation paid to a member
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2.2 ENLISTMENT BONUSES

AC_k^{EB}	Average cost of enlistment bonus for a member into rating k
$AM_{i,k}^{EB}$	Average cost of enlistment bonus for rating k, LOS i
EMY_k	Expected manyears for rating k
L_k	Total number of lower quality recruits in rating k
H_k	Total number of higher quality recruits in rating k
MC_k^{EB}	Marginal cost of enlistment bonus in rating k
\bar{B}_k	Measure of pay for which the supply elasticity is defined
EB_k	Enlistment bonus paid to a member enlisting in rating k
S_k^e	Enlistment supply elasticity

2.3 SELECTIVE REENLISTMENT BONUS

AC_{jk}^{SRB}	= Average cost of the SRB program for grade j, rating k
TC_k^{SRB}	= Total annual amount spent on SRB's for rating k
$E_{4/9,k}$	= Member inventory for grades E4-E9 for rating k

2.4 PERMANENT CHANGE OF STATION

WA_{jk}	Composite weight allowance for grade j, rating k
E_{jk}	Inventory for grade j, rating k
X_{jk}	% of members with dependents in grade j, rating k
Y_{jk}	% of members in grade j, rating k with LOS 2 years
WT_j	Weight allowance for members without dependents in grade j
WT_j^{DEP}	Weight allowance for members with dependents in grade j
AC_{jk}^{SEPM}	Average cost of a separation move for grade j, rating k
AC^{SEPM}	All-Navy average cost of a separation move
E	Total member inventory
AC_{jk}^{TRNM}	Average cost of a training move for grade j, rating k
AC^{TRNM}	All-Navy average cost of a training move
AC_{jk}^{OCON}	Average cost of OCONUS move for grade j, rating k
AC^{ROTS}	All-Navy average cost of a rotational move
AC_{jk}^{CON}	Average cost of CONUS move for grade j, rating k

AC^{OPS}	All-Navy average cost of an operational move
AC_{jk}^{ROT}	Average cost of a rotational move for grade j, rating k
P^{OC}	Expected number of rotational moves per member
OC_k	Percentage of members OCONUS in rating k
TL_k^{OC}	OCONUS tour length for members in rating k
cr_{jk}	Average continuation rate for grade j, rating k
Acc	Percentage of total force that are accessions
AC_{jk}^{OPS}	Average cost of an operational move for grade j, rating k
TL_k^C	CONUS tour length for members in rating k
P^C	Probability of an operational move
$AC_{j,k}^{PCS}$	Average cost of a PCS move for grade j, rating k

2.5 SEPARATION COSTS

AC_{jk}^{LEAVE}	Average cost of accrued leave by grade j, rating k
AC_{jk}^{bp}	Average cost of basic pay by grade j, rating k
AML_j	Average accrued monthly leave grade j
CR_{jk}	Continuation rate by grade j, rating k
AC^{SEV}	Average cost of severance/disability pay all-Navy
$AC_{j,k}^{SEV}$	Average cost of severance/disability pay for grade j, rating k
SEV_{TOT}	Total cost of severance/disability pay
E_j	Inventory for grade j
AC_{jk}^{SEP}	Average separation costs by grade j, rating k
AC_{jk}^{SMOV}	Average cost of separation move by grade j, rating k

2.6 RETIRED PAY ACCRUAL

AC_{jk}^{rp}	Average cost per capita of retired pay accrual for grade j, rating k
AC_{jk}^{bp}	Average annual basic pay paid to members in grade j, rating k
r_{act}	Fixed normal cost rate obtained from DoD actuary tables

2.7 SPECIAL PAYS

AC_{jk}^{sp}	Average cost of a special pay for grade j, rating k
SP_{jk}	Number of people receiving a special pay by rating and pay grade

E_{jk}	Inventory for grade j, rating k
AC_{SP}	All Navy average cost for a special pay

2.8 OTHER BENEFITS

AC^{MISC}	Average cost of miscellaneous benefits paid to members
OB_{TOT}	Total cost of survivor benefits, apprehension of deserters and adoption expenses.
E	Total Navy inventory
AC_{jk}^{cloth}	Average cost of clothing allowances by grade j and rating k
E_{jk}	Inventory by grade j, rating k
$\%_{male}_{a/b}$	Percentage of male Navy personnel in grades a-b
$cloth_{1m}$	Basic clothing allowance for males
$cloth_{1f}$	Basic clothing allowance for females
$cloth_{2m}$	Standard clothing allowance for males
$cloth_{2f}$	Standard clothing allowance for females
$cloth_{3m}$	Special clothing allowance for males
$cloth_{3f}$	Special clothing allowance for females
AC_{jk}^{FICA}	Average cost of FICA tax for grade j, rating k
$\% FICA$	Current FICA tax rate
AC_{jk}^{bp}	Average cost of basic pay for grade j, rating k
AC_{jk}^{sp}	Average cost of special pay for grade j, rating k

2.9 GI BILL

PV	Present value of the GI Bill
r	Discount rate
EPV_k	Expected present value of the GI Bill
EMY_k	Expected manyears for rating k
U	Usage rate

2.10 OFFICER ACQUISITION

$AC^{OFF, Acc}$	Average cost of officer acquisitions
TC^{USNA}	Total cost of the USNA
O^{USNA}	Number of officers commissioned through the USNA

TC^{NROTC}	Total cost of NROTC
O^{NROTC}	Number of officers commissioned through NROTC
TC^{OCS}	Total cost of OCS
O^{OCS}	Number of officers commissioned through OCS
$AC_{ik}^{OFF, Acc}$	Average cost of officer acquisition for LOS i, designator k
EMY_k	Expected manyears for designator k

2.11 ENLISTED RECRUITING

AC_k^{REC}	Average cost of recruiting a member into rating k
R / S	Total cost of recruiter support
ADV	Total advertising cost of recruiting
MPN	Total MPN cost of recruiting
L	Total number of lower quality recruits, all navy
H	Total number of higher quality recruits, all navy
L_k	Total number of lower quality recruits in rating k
H_k	Total number of higher quality recruits in rating k
E	Total member inventory
E_k	Total member inventory in rating k
$AC^{REC, H}$	Average cost of a high-quality recruit
$AC^{REC, L}$	Average cost of a low-quality recruit
EMY_k	Expected manyears for rating k
AC_{ik}^{REC}	Average cost of recruiting a member into rating k for LOS i
$Rec_Cost_{COAS, k}$	COAS cost of recruiting a member into rating k
$Rec_Cost_{COAS, AN}$	COAS cost of recruiting a member into the Navy

2.12 MEDICAL COSTS

$AC_j^{CHAMPUS}$	Average CHAMPUS cost per member in grade j
$TC_j^{CHAMP, DEP}$	Total CHAMPUS cost per dependent per grade j
Dep_j	Number of dependents in grade j
AFS_j	Average family size of a member in grade j
$TC^{CHAMP, RET}$	Total CHAMPUS cost for retirees
E_j	Inventory for grade j
AC_j^{DC}	Average cost of direct medical care for military members in grade j

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$TC_j^{MED, MEM}$	Total cost of direct medical care for military members in grade j
$TC_j^{MED, DEP}$	Total cost of direct medical care for dependents of members in grade j
TC^{OTHER}	Total cost of other medical services
AC_j^{DEN}	Average cost of direct dental care for military members in grade j
$TC_j^{DEN, MEM}$	Total cost of direct dental care for military members in grade j
$TC_j^{DEN, DEP}$	Total cost of direct dental care for dependents of members in grade j
TC^{OTHER}	Total cost of other medical services
E	Total member inventory

3. DISCUSSION OF COST POLICY MODULES

This section describes the COMET Active Component policy modules individually. Each description may contain the following information:

- Composition - A discussion of the specific policy that generates that manpower cost.
- Average Cost Computation - A discussion of the methodology used to calculate the average cost for a specific policy.
- Discussion - A general discussion of the policy module calculations and data sources.
- Notation - Lists the definitions of variables used in the text.

All cost elements are divided into direct and variable indirect categories. The following table details this mapping and provides some information on each of the major cost components. Each component will be discussed at length in the sections of this chapter.

DIRECT	VARIABLE INDIRECT
Military Comp Basic Pay BAQ BAS VHA Enlistment Bonuses Reenlistment Bonuses PCS Costs Rotational Moves Operational Moves Accession Moves Training Moves Separation Costs Severance Pay Unused Leave Separation Move Retired Pay Accrual Special Pays Flight Pay Hazardous Duty Diving Duty Hostile Fire Sub Pay Foreign Language Proficiency Special Duty Assignment Certain Places Career Sea Pay Family Separation Allowance Overseas Housing Allowance Nuclear Pay Medical Corps Dental Corps Medical Service Corps Board Certified Incentive Pays Nuclear Aviation Medical Multiyear Medical Certified RN Anesthesiologist Other Benefits Clothing Allowance FICA Misc Benefits	Officer Acquisition USNA OCS NROTC Student Support Enlisted Recruiting Recruiter Support Advertising Training Medical Support COAS Individual's Account Base Support Administrative Activities Medical Support Direct Care Champus Retiree Champus Dependent and Member Dental

G.I. Bill

3.1 MILITARY COMPENSATION

3.1.1 Composition

Military Compensations consists of all variable costs that compose basic pay, quarters (BAQ) and subsistence (BAS) allowances, and variable housing allowance (VHA).

- Basic pay is a direct variable cost and is the largest component of military compensation. The amount of basic pay a member receives is a function of pay grade and length of service.
- Basic Allowance for Quarters (BAQ) is paid to military members who do not occupy government housing or who occupy government housing that is not adequate. There are two rates: one for those “with dependents” and one for those “without dependents.” The cost of providing BAQ varies with grade and category of dependents. Members who reside in quarters, on the other hand, receive BAQ-in-kind.
- Basic Allowance for Subsistence (BAS) represents both the cost of food for personnel eating in government messes and the cash payments to military members in lieu of food. BAS is a function of the number of people receiving cash in lieu of mess privileges and the cost of food to DoD. For this iteration, the calculations assume that the average cost to the government for providing rations is equal to the BAS rate.
- Variable Housing Allowance (VHA) is paid to military members receiving BAQ whose families reside in high cost housing areas of CONUS. Cost varies as a function of the number of member families residing in high cost areas in CONUS, the cost of local housing relative to BAQ rates and pay grade. A weighted average across all locations based on pay grade and rating is used in these calculations. Alternatively, the user may stipulate an annual amount by paygrade and occupation.

3.1.2 Average Cost Computation

Average basic pay is determined by first multiplying the inventory of members for all grades, LOS, and ratings by the appropriate basic pay rate. This figure is then summed across LOS for each pay grade and rating and divided by the total inventory for that pay grade and rating. This yields the average annual basic pay for each grade by rating. The longevity increments (time in service raises) for a grade are weighted by the inventory in that grade.

$$AC_{jk}^{bp} = \frac{\sum_{i=1}^{30} bp_{ij} E_{ijk}}{\sum_{i=1}^{30} E_{ijk}}$$

To calculate average BAQ, assuming *all* members receive BAQ in cash, the model multiplies the BAQ rates, both with and without dependents, by the percentage of members in each pay grade and rating with and without dependents. The sum of these two numbers is the average BAQ for that pay grade by rating:

$$AC_{jk}^{baq1} = (w_dep\%_{jk})(bq1_j) + [1 - (w_dep\%_{jk})](bq2_j)$$

The average VHA by pay grade and rating is estimated by the Defense Manpower Data Center (DMDC) from the Joint Uniform Military Pay System (JUMPS) file that records the actual amount of VHA paid to members in 1997.

To calculate average BAQ, assuming *some* members receive BAQ-in-kind, the percentages of all members by grade, with and without dependents, who receive BAQ in cash (m_cash and s_cash) are summed. This percentage is then subtracted from 1 and multiplied by the percentage of members with dependents in that rating to calculate the percentage of members receiving BAQ-in-kind. A similar calculation is used to estimate the percentage of members without dependents receiving BAQ-in-kind. The calculation assumes that m_kind + s_kind + m_cash + s_cash = 1:

$$m_kind_{jk} = [1 - (m_cash_j + s_cash_j)](w_dep\%_{jk})$$

$$s_kind_{jk} = [1 - (m_cash_j + s_cash_j)](1 - w_dep\%_{jk})$$

The average BAQ, assuming *some* members receive BAQ-in-kind and some in-cash, is simply the percentage of members by grade, with and without dependents, who receive BAQ in cash multiplied by the BAQ rate:

$$AC_{jk}^{baq2} = (m_cash_j \bullet bq1_j) + (s_cash_j \bullet bq2_j) + (s_kind_{jk} \bullet bq3_j)$$

Similarly, the VHA rate assuming a mix of BAQ-in-kind and cash is the fraction of those receiving VHA multiplied by the average VHA rates:

$$AC_{jk}^{vha2} = fract_vha_{jk}(vha_yr_{jk})$$

Average BAS is determined by calculating the weighted average of all who receive BAS using the information from the MPN Budget Justification Book. To determine total military compensation paid to a member, the previously computed components are summed:

$$AC_{jk}^{mc} = AC_{jk}^{dp} + AC_{jk}^{baq1} + AC_{jk}^{vha1} + AC_{jk}^{bas}$$

3.1.3 Discussion

The data for military compensation is extracted from the appropriate OSD pay tables, allowance tables, or RMC/BMC tables using a pay table look-up procedure. The only exception is VHA which is obtained from a DMDC calculation of average VHA by rating and pay grade as of the end of FY97.

A pay table look-up procedure, as opposed to using a snapshot of the JUMPS file, provides the user with the ability to avoid random fluctuations in the amount of pay received by a member. In addition, it provides the user the flexibility to update the pay tables when appropriate so that changes in manpower costs can be reflected immediately. Military Personnel—Navy (MPN) accounts for the largest portion of total billet cost; thus, factor accuracy is easily maintained.

3.1.4 Notation

AC_{jk}^{bp}	Average cost of basic pay paid to members in grade j and rating k
bp_{ij}	Basic pay for an individual member in LOS i and grade j
E_{ijk}	Inventory of members in LOS i, grade j and rating k
AC_{jk}^{baq1}	Average BAQ for grade j, rating k assuming all members receive BAQ in cash
$w_dep\%_{jk}$	% of members in grade j, rating k with dependents
$bq1_j$	Rate of BAQ for members drawing w/dependents in grade j
$bq2_j$	Rate of BAQ for members drawing w/o dependents in grade j
$bq3_j$	Rate of partial BAQ for members without dependents in grade j
m_kind_{jk}	% of members with dependents drawing BAQ-in-kind by grade and rating
s_kind_{jk}	% of members without dependents drawing BAQ-in-kind by grade and rating
m_cash_j	% of members with dependents drawing BAQ-in-cash by grade
s_cash_j	% of members without dependents drawing BAQ-in-cash by grade
AC_{jk}^{baq2}	Average BAQ for grade j, rating k assuming some members receive BAQ-in-kind
AC_{jk}^{vha2}	Average VHA for grade j assuming some members receive BAQ-in-kind
$fract_vha_{jk}$	Fraction of those receiving VHA by grade and rating
vha_yr_{jk}	Average VHA yearly rate for members in grade j, rating k who do not live in government quarters
AC^{bas}	Average amount of BAS received

AC_{ik}^{mc}	Average annual compensation paid to a member
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3.2 ENLISTMENT BONUSES

3.2.1 Composition

This module consists of the direct costs associated with the provision of enlistment bonuses.

3.2.2 Average Cost Computation

Enlistment bonuses vary by rating. The average cost for an enlisted person in a particular rating is calculated by dividing the total amount of bonuses paid by the number of high-quality accessions into that rating:

$$AC_k^{EB} = \frac{EB_k}{H_k}$$

Next, this average bonus per high-quality recruit is weighted by the percent high quality in rating k:

$$AC_k^{EB} = \frac{EB_k}{H_k} * \frac{H_k}{E_k}$$

To acquire grade and rating specific estimates, this term is then averaged across pay grades based on the inventories grouped by pay grade, LOS, and rating.

$$AM_k^{EB} = \frac{AC_k^{EB}}{EMY_k}$$

3.2.3 Marginal Cost Computation

For lower quality recruits, it is assumed that marginal cost of enlistment bonuses is equal to average cost. For higher quality recruits, marginal cost is computed under the assumption that the marginal recruit is attracted into A rating by enlistment bonuses and is, therefore, a five-year enlistment. The marginal cost of a higher quality recruit, then, is equal to average cost plus the infra-marginal rents generated by the higher bonus necessary to attract the marginal recruit:

$$MC_k^{EB} = AC_k^{EB} + \left(\bar{B}_k + EB_k \right) \left(\frac{1}{S_k^e} + 1 \right) - \bar{B}_k$$

where \bar{B}_k is the measure of pay for which the enlistment supply elasticity, S^e , is defined.

(Generally, it is the present value of first pay term discounted by 7%, the discount rate found in Appendix C of Revised OMB Circular A-94.) Note that marginal cost is equal to the change in total cost with respect to a change in output, or

$$MC = \frac{dTC}{dQ} \text{ and } TC = PQ \text{ where } P = \text{price}, Q = \text{quantity}$$

Then,

$$\frac{dPQ}{dQ} = P \frac{dQ}{dQ} + Q \frac{dP}{dQ} = P + P \frac{Q}{P} \cdot \frac{dP}{dQ}$$

where $\frac{Q}{P} \frac{dP}{dQ}$ is the inverse of the supply elasticity, S^e . Hence, $\frac{dTC}{dQ} = P \left(1 + \frac{1}{S^e} \right)$.

Now, let $P = EB_k + \bar{B}_k$ and $Q = \text{Recruit}$; thus $\frac{dTC}{dQ} = \left(\bar{B}_k + EB_k \right) \left(1 + \frac{1}{S^e} \right)$

Note that because the typical recruit does not receive his/her enlistment bonus until after completing recruit training, we have omitted the effects of early attrition.

The marginal cost for Rating k is

$$MC_k = \frac{H_k}{H_k + L_k} MC_k^{HR}$$

3.2.4 Discussion

The Navy Recruiting Command made all of the data categorized by budget appropriations available. Our point of contact was CDR Roust at (703) 696-5231.

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3.2.5 Notation

AC_k^{EB}	Average cost of enlistment bonus for a member into rating k
$AM_{i,k}^{EB}$	Average cost of enlistment bonus for rating k, LOS i
EMY_k	Expected manyears for rating k

L_k	Total number of lower quality recruits in rating k
H_k	Total number of higher quality recruits in rating k
MC_k^{EB}	Marginal cost of enlistment bonus in rating k
\bar{B}_k	Measure of pay for which the supply elasticity is defined
EB_k	Enlistment bonus paid to a member enlisting in rating k
S_k^e	Enlistment supply elasticity

3.3 SELECTIVE REENLISTMENT BONUS

3.3.1 Composition

This module consists solely of the Selective Reenlistment Bonus. The bonus offer is computed as

$$SRB = \text{Award Level} \times \text{Monthly Basic Pay} \times \text{Years of Reenlistment}.$$

Reenlistment bonuses are offered to members of a particular rating or NEC on a discretionary basis at zone A (LOS 2-6), zone B (LOS 7-10) and zone C (LOS 11-14). The award level may vary from zero to six. Currently, 50% of the SRB is paid to the member as a lump-sum at the time of the reenlistment, while the remainder is paid in equal, annual installments over the period of the reenlistment contract.

3.3.2 Average Cost Computation

Using the Navy's SRB report to calculate the average cost of the SRB program for a particular billet is unreliable both because of the movement between NEC's to maximize the level of SRB received and because the changes in the SRB report occur quarterly. Instead, the model takes the total amount of bonuses paid to a rating over the course of the year and divides it by the inventory for that rating for grades E4-E9:¹

$$AC_{jk}^{SRB} = \frac{TC_k^{SRB}}{E_{4/9,k}}$$

This average cost is added to each grade E4-E9 for that rating. Bonuses that are awarded based only on NEC are divided up among all the ratings with members of that NEC.

¹ Grades E1-E3 are not included because they are not generally eligible to reenlist.

3.3.3 Discussion

Bonus amount data was provided by Brenda Billingsley at N130D2, (703) 695-3130. The Rating/NEC inventories came from the Enlisted Distribution Projection System, EPROJ II, (703) 695-9342.

3.3.4 Notation

AC_{jk}^{SRB}	Average cost of the SRB program for grade j, rating k
TC_k^{SRB}	Total annual amount spent on SRB for rating k
$E_{4/9,k}$	Member inventory for grades E4-E9 for rating k

3.4 PERMANENT CHANGE OF STATION

3.4.1 Composition

This module is divided into five “move” categories: (1) rotational, (2) operational, (3) accession, (4) training, and (5) separation. Costs are calculated for each of these categories but cost totals for this element reflect only rotational and operational moves. Accession, training and separation moves are reflected in the totals of other cost elements that are amortized as investment costs over the expected man-years of service.

3.4.2 Average Cost Computation

PCS costs are a function of the weight allowance per grade, tour length and the inventory of rating requirements overseas. Before costs can be calculated, however, weight allowances must be adjusted to take into account the rules that apply to E-4s and below. Two rules apply: (1) whether or not the member has dependents and (2) whether or not the member has fewer than 2 years of service. To calculate a single weight allowance each for E-4s and E-1/E-3s, we applied the current distribution of married/unmarried members with fewer than two years of service and calculated a weighted average:

$$WA_{1/3,k} = \frac{(WA_{1/3}^{Dep} \bullet E_{1/3,k} \bullet X_{1/3,k}) + (WA_3^{w/oDep} \bullet E_{3,k} + WA_{2/3}^{w/oDep} \bullet E_{1/2,k})(1 - X_{i/jk})}{E_{1/3,k}}$$

$$WA_{4,k} = WA_{4,>2}^{Dep} \bullet X_{4,k} Y_{4,k} + WA_{4,<2}^{Dep} \bullet X_{4,k} (1 - Y_{4,k}) + WA_{4,>2}^{w/oDep} \bullet (1 - X_{4,k}) Y_{4,k} + \\ WA_{4,<2}^{w/oDep} \bullet (1 - X_{4,k}) (1 - Y_{4,k})$$

Then we added the weight allowance for each grade and rating:

$$WA_{jk} = WT_j (1 - X_{jk}) + WT_j^{DEP} \bullet X_{jk}$$

3.4.2.1 Accession

The cost factor for accession moves is the average cost per accession move. This cost is multiplied by the number of accessions in a projection year.

3.4.2.2 Separation

The cost factors for separation moves equal the estimated average costs per separation move by grade. Weight allowances by grade and rating are used to expand the all-Navy average cost of a separation move into a per-grade cost,

$$AC_{jk}^{SEPM} = \frac{AC^{SEPM} WA_{jk}}{\sum_j WA_{jk} \frac{E_{jk}}{E}}$$

AC^{SEPM} is the Navy average cost of a separation move, WA_{jk} is the average weight allowance in grade j and rating, E_{jk} is the inventory of grade j, rating k, and E is the total Navy inventory.

3.4.2.3 Training

The training move cost factors are defined as the average cost of a training move by grade and rating. They are calculated in an analogous fashion to the separation move factors. The Navy average cost for a training move is calculated as follows:

$$AC_{jk}^{TRNM} = \frac{AC^{TRNM} WA_{jk}}{\sum_j WA_{jk} \frac{E_{jk}}{E}}$$

3.4.2.4 Rotational and Operational

COMET calculates and displays the cost per OCONUS and CONUS move just as it does for the other move categories. However, for CONUS and OCONUS moves, COMET also calculates the probability of a move prior to calculating the average cost of any PCS moves per member of a particular grade and rating.

The average cost of an OCONUS move, given that a move is made, is

$$AC_{jk}^{OCON} = AC^{ROTS} \frac{WA_{jk}}{\sum_j WA_{jk} \frac{E_{jk}}{E}}$$

The average cost of a CONUS move, given that a move is made, is

$$AC_{jk}^{CON} = AC^{OPS} \frac{WA_{jk}}{\sum_j WA_{jk} \frac{E_{jk}}{E}}$$

The average cost of CONUS and OCONUS moves per member are calculated using the probability of making a move. The key assumption in calculating this probability is that operational moves are generated as a residual, after moves out of OCONUS fill empty CONUS positions. The average cost of a rotational move can be expressed as

$$AC_{jk}^{ROTS} = P^{OC} AC_{jk}^{OCON}$$

where

$$P^{OC} = \frac{numrot_{AlNav}}{OCONUS_{AlNav}} \bullet \frac{OCONUS_k}{E_k}$$

and the term P^{OC} is the probability of a service member making a rotational move, which varies by rating k. The per capita moves required to move members from overseas and to replace those departing overseas is equal to two times the proportion of members stationed overseas, $2OC$, divided by the expected OCONUS tour length, TL_k^{OC} , less the per capita moves required to rotate members who will be separating from the Navy, the second term in brackets, less a percentage that represents accession moves to OCONUS positions, $OC_k (Acc)$, where Acc is the total force accession percentage. The per capita moves value for those members whose OCONUS tour has ended is achieved by multiplying the proportion of members stationed overseas by the average continuation rate, c_{jk} , to avoid double counting moves associated with separations.

The average cost per member of an operational move is then calculated as

$$AC_{jk}^{OPS} = P^C AC_{jk}^{CON}$$

where

$$P^C = \frac{numops_{AlNav}}{CONUS_{AlNav}} \bullet \frac{CONUS_k}{E_k}$$

The term P^C is the probability of making an operational move, which equals the per capita moves required to fill CONUS positions (the proportion of CONUS members divided by the average CONUS tour length, TL), less the number of positions that will be filled by those members rotating back from OCONUS, the second term in brackets, and less the proportion of those accession moves made to CONUS positions.

The structured cost database, then, displays an average cost of a PCS move that is calculated as shown below:

$$AC_{jk}^{PCS} = AC_{jk}^{ROTS} + AC_{jk}^{OPS}$$

3.4.3 Discussion

Missing from this module is an equation describing the equilibrium tour length. The simplifying assumption is that there are sufficient CONUS billets such that the number of operational moves adjust to whatever tour lengths for CONUS and OCONUS are specified.

The majority of data is from the MPN Budget Justification Book and the current Joint Travel Regulations (JTR). The number of members with dependents and the number of members OCONUS was obtained from DMDC.

3.4.4 Notation

WA_{jk}	Composite weight allowance for grade j, rating k
E_{jk}	Inventory for grade j, rating k
X_{jk}	% of members with dependents in grade j, rating k
Y_{jk}	% of members in grade j, rating k with LOS 2 years
WT_j	Weight allowance for members without dependents in grade j
WT_j^{DEP}	Weight allowance for members with dependents in grade j
AC_{jk}^{SEPM}	Average cost of a separation move for grade j, rating k
AC^{SEPM}	All-Navy average cost of a separation move
E	Total member inventory
AC_{jk}^{TRNM}	Average cost of a training move for grade j, rating k
AC^{TRNM}	All-Navy average cost of a training move
AC_{jk}^{OCON}	Average cost of OCONUS move for grade j, rating k
AC^{ROTS}	All-Navy average cost of a rotational move
AC_{jk}^{CON}	Average cost of CONUS move for grade j, rating k

AC^{OPS}	All-Navy average cost of an operational move
AC_{jk}^{ROT}	Average cost of a rotational move for grade j, rating k
P^{OC}	Expected number of rotational moves per member
OC_k	Percentage of members OCONUS in rating k
TL_k^{OC}	OCONUS tour length for members in rating k
cr_{jk}	Average continuation rate for grade j, rating k
Acc	Percentage of total force that are accessions
AC_{jk}^{OPS}	Average cost of an operational move for grade j, rating k
TL_k^C	CONUS tour length for members in rating k
P^C	Probability of an operational move
$AC_{j,k}^{PCS}$	Average cost of a PCS move for grade j, rating k

3.5 SEPARATION COSTS

3.5.1 Composition

When a service member leaves the service, he or she receives accrued leave benefits, severance/disability pay and a separation move.

3.5.2 Average Cost Computation

When a service member leaves the Navy, the member is authorized to cash in any unused leave at the rate of basic pay to which he or she is entitled at the time of separation. The lump sum leave payment is calculated by multiplying average number of months leave accrued for each grade by base pay by the probability of separation:

$$AC_{jk}^{LEAVE} = AC_{jk}^{bp} \bullet AML_j (1 - CR_{jk})$$

A service member is authorized severance pay for involuntary separations. Various causes for separation result in different severance payments. The average cost of severance/disability pay per leave is calculated by dividing the total severance pay by the number of separations:

$$AC^{SEV} = \frac{SEV_{tot}}{\sum_j [(1 - CR_j) E_j]}$$

Then, the average severance pay for a member in pay grade j, rating/designator k is

$$AC_{j,k}^{SEV} = AC^{SEV} * (1 - CR_{j,k})$$

Average cost for separation pay is the sum of the above costs plus the cost of a separation move:

$$AC_{jk}^{SEP} = AC_{jk}^{LEAVE} + AC_{j,k}^{SEV} + AC_{jk}^{SMOV}$$

3.5.3 Discussion

All figures were received from the MPN Budget Justification Book. Separation payments resulting from the Navy's draw-down (SSB, VSI, 15-year Retirement) have not been included. These payments are transitory in nature and should not be included as a normal cost of a sailor.

3.5.4 Notation

AC_{jk}^{LEAVE}	Average cost of accrued leave by grade j, rating k
AC_{jk}^{bp}	Average cost of basic pay by grade j, rating k
AML_j	Average accrued monthly leave grade j
CR_{jk}	Continuation rate by grade j, rating k
AC^{SEV}	Average cost of severance/disability pay all-Navy
$AC_{j,k}^{SEV}$	Average cost of severance/disability pay for grade j, rating k
SEV_{TOT}	Total cost of severance/disability pay
E_j	Inventory for grade j
AC_{jk}^{SEP}	Average separation costs by grade j, rating k
AC_{jk}^{SMOV}	Average cost of separation move by grade j, rating k

3.6 RETIRED PAY ACCRUAL

3.6.1 Composition

Retired Pay Accrual consists of the direct costs associated with DoD's contribution to its military retirement fund under the provisions of 10 USC 1466 of the FY84 Defense Authorization Act, Public Law 98-94. Under the accrual concept, each service budgets for retired pay in the Military Personnel account and transfers funds on a monthly basis to the Military Retirement Trust fund from which payments are made to retirees.

3.6.2 Average Cost

Retired pay accrual average per capita cost is determined by multiplying the basic pay by a fixed normal cost percentage obtained from the DoD actuary. The calculation estimates the accrual percentage based on DoD retention rates and retirement probabilities.

$$AC_{jk}^{rp} = AC_{jk}^{bp} \bullet r_{act}$$

3.6.3 Notation

AC_{jk}^{rp}	Average cost per capita of retired pay accrual for grade j, rating k
AC_{jk}^{bp}	Average annual basic pay paid to members in grade j, rating k
r_{act}	Fixed normal cost rate obtained from DoD actuary tables

3.7 SPECIAL PAYS

3.7.1 Composition

The Special Pays category includes all costs associated with pays awarded to individuals who perform certain types of duties, including hazardous duty, sea duty, submarine duty, diving duty, nuclear duty, medical personnel, overseas allowances, foreign language proficiency pay, family separation allowance, and special duty assignment pay. Special pay cost calculations are explained in the sections below.

3.7.2 Average Cost Computation

The average cost of all special pays varies by both pay grade and rating. The general formula for calculating a pay is

$$AC_{jk}^{sp} = AC_SP_j \bullet \frac{SP_{j,k}}{E_{j,k}}$$

SP_{jk} is the number of people receiving that special pay by rating for each grade. E_{jk} is the inventory for that grade and rating. AC_SP is the average cost of that special pay.

Members are allowed to receive (at most) two hazardous duty pays. To account for this possibility, SP_{jk} sums the number of hazardous duty pays given to a particular rating and grade instead of the number of people receiving the pay.

For submarine, diving and medical pays, the full amount based on pay grade is applied to the ratings that require these skills. All other ratings receive zero for these categories.

The average cost of overseas allowance is computed by multiplying the percent of Naval personnel OCONUS by grade and rating by the overseas rate.

3.7.3 Notation

AC_{jk}^{sp}	Average cost of a special pay for grade j, rating k
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SP_{jk}	Number of people receiving a special pay by rating and pay grade
E_{jk}	Inventory for grade j, rating k
AC_{SP}	All Navy average cost for a special pay

3.8 INCENTIVE PAYS

3.5.1 Composition

The Incentive Pays category consists of all pays awarded to officers with certain types of skills who generally incur some type of obligation in exchange for some type of obligation.* They include aviation pay, nuclear pay, medical incentive pay, multiyear medical pay and RN anesthesiologist pay. The default cost for all incentive pays is set to zero; however, the user may select to award the full amount to particular designators. For the medical incentive pay and the multiyear medical pay, the user must select a medical specialty. In addition to selecting existing pays, the user may create a new special pay to be awarded to any designator.

3.9 OTHER BENEFITS

3.9.1 Composition

This module contains all direct and variable indirect costs associated with the provision of miscellaneous benefits, including:

- Death gratuities paid to beneficiaries of military personnel who die during active duty.
- Apprehension of deserter rewards.
- Unemployment compensation paid to eligible ex-servicemen.
- Survivor benefits paid to spouses and children of deceased service members.
- Adoption expenses.
- Clothing allowances.
- Government contribution to social security tax.

3.9.2 Average Cost Computation

3.9.2.1 Miscellaneous

Average cost of survivor benefits, apprehension of deserters and adoption expenses are estimated by dividing their total cost by the total member inventory. This average can then be applied to all members:

* Enlisted personnel receive incentive pays in the form of Selective Reenlistment Bonuses (discussed above)

$$AC^{MISC} = \frac{OB_{TOT}}{E}$$

OB_{TOT} equals the total MPN cost for survivor benefits, apprehension of deserters and adoption expenses.

The average cost of death gratuities for enlisted personnel is computed by dividing the total cost of enlisted gratuities by the enlisted personnel inventory. The same procedure is applied to determine the average cost for officers. Unemployment compensation is only given to enlisted members.

3.9.2.2 Clothing Allowance

Each enlisted member is authorized an initial issue of clothing plus a basic replacement allowance through his or her 36th month, a standard replacement allowance until the third year after making E-7, and a special replacement allowance from then through the end of his or her enlistment. Each member receives an additional clothing allowance on advancement to E-7. Each replacement allowance is weighted by sex, added together and divided by the enlisted inventory. The initial clothing allowances are weighted by sex, and the full amount given to that pay grade:

$$AC_{jk}^{cloth} = \frac{\sum_{i=1}^3 E_{ijk} [\%_male_{1/3} \bullet cloth_1_m + (1 - \%_male_{1/3}) cloth_1_f]}{\sum_{i=1}^9 E_j} + \frac{\sum_{i=4}^{16} E_{ijk} (\%_male_{4/6} \bullet cloth_2_m + (1 - \%_male_{4/6}) cloth_2_f)}{\sum_{i=1}^9 E_j} + \frac{\sum_{i=17}^{30} E_{ijk} [\%_male_{7/9} \bullet cloth_3_m + (1 - \%_male_{7/9}) cloth_3_f]}{\sum_{i=1}^9 E_j}$$

3.9.2.3 FICA

The FICA tax represents the funds paid to the Social Security Administration as required by the Federal Insurance Contribution Act. The FICA tax is calculated by multiplying a member's

annual base pay plus special pays up to the limit set by tax codes, and then, by the applicable percentage:

$$AC_{jk}^{FICA} = \% FICA (AC_{jk}^{bp} + AC_{jk}^{sp})$$

3.9.3 Discussion

All costs are found in the MPN budget justification books. To determine the LOS at which the clothing allowance goes from standard to special, Average-Time-in-Service until Promotion table statistics are used.

3.9.4 Notation

AC^{MISC}	Average cost of miscellaneous benefits paid to members
OB_{TOT}	Total cost of survivor benefits, apprehension of deserters and adoption expenses.
E	Total Navy inventory
AC_{jk}^{cloth}	Average cost of clothing allowances by grade j and rating k
E_{jk}	Inventory by grade j, rating k
$\%_male_{a/b}$	Percentage of male Navy personnel in grades a-b
$cloth_1_m$	Basic clothing allowance for males
$cloth_1_f$	Basic clothing allowance for females
$cloth_2_m$	Standard clothing allowance for males
$cloth_2_f$	Standard clothing allowance for females
$cloth_3_m$	Special clothing allowance for males
$cloth_3_f$	Special clothing allowance for females
AC_{jk}^{FICA}	Average cost of FICA tax for grade j, rating k
$\% FICA$	Current FICA tax rate
AC_{jk}^{bp}	Average cost of basic pay for grade j, rating k
AC_{jk}^{sp}	Average cost of special pay for grade j, rating k

3.10 GI BILL (ENLISTED ONLY)

3.10.1 Composition

This module estimates the expected present value of the basic GI Bill benefits. The basic benefit is actually funded by the Veteran's Administration and appears in neither the Navy's nor the Department of Defense's budget. However, this module computes the expected present value, at the time of enlistment, of the net government outlays associated with the basic benefit.

To participate in the basic benefit of the GI Bill, a member must be a high school graduate and must decide to participate in the program shortly after his or her enlistment. The program is contributory, and if a member chooses to participate, \$100 per month for twelve consecutive months is deducted from the participant's pay check.

The basic benefit is equal to \$300 per month for up to 36 months for an enlistment of three or more years. The stipend is payable to individuals who enroll in full-time college programs. Partial payments are awarded to members who enroll part-time.

3.10.2 Average Cost Computation

The present value is computed by summing up and discounting the expected outlays per participant, then multiplying that number by the usage rate and subtracting from that the contribution that the member makes.

$$PV = \sum_{t=1}^{12} \frac{-100}{\left(1 + \frac{r}{12}\right)^t} \cdot P + \sum_{t=37}^{84} \frac{300}{\left(1 + \frac{r}{12}\right)^t} \cdot U$$

This number is then averaged across inventory pay grades and grouped by LOS and rating:

$$EPV_k = \frac{PV}{EMY_k}$$

3.10.3 Notation

PV	Present value of the GI Bill
P	Number of enrollees
r	Discount rate
EPV_k	Expected present value of the GI Bill
EMY_k	Expected manyears for rating k
U	Usage rate

3.11 OFFICER ACQUISITION

3.11.1 Composition

This module includes costs associated with the acquisition of officers into the Navy. Costs include advertising, scholarships, initial training, military pay and allowances, instructor costs, and operations and support costs. Costs accrue from the following officer-generating sources:

- **United States Naval Academy.** The curriculum is oriented primarily toward academics during the school year and intensive military training during the summer months. The four-year course of instruction, which results in a Bachelor of Science degree, is designed to produce career-oriented officers for the Navy.
- **Officer Candidate School.** This school trains selected enlisted personnel and college graduate OCS applicants to serve as commissioned officers. It commissions officers in all the accession specialty areas.
- **Navy ROTC.** The objective of NROTC is to attract, motivate, and prepare selected college students with potential to serve as commissioned officers in the active force and Naval Reserve. The program consists of scholarship and non-scholarship students. Scholarship students receive tuition, books, and monthly stipend while attending an NROTC-designated college. They receive training each summer for which they are paid. Non-scholarship students take NROTC courses but do not receive any compensation until they become contracted students in their junior year. At this point, they begin collecting a monthly stipend. They receive summer cruise training between their junior and senior years for which they are paid. After successful completion of this program, both groups of midshipmen are commissioned as ensigns.

3.11.2 Average Cost Computation

Officer acquisition costs are broken down into MPN and OMN appropriations. MPN costs consist of student pay and allowances, instructor pay and allowances, and the NROTC cruise costs. OMN costs consist of advertising costs, scholarship costs and operational support costs. There are also procurement and reserve instructor costs. To estimate an average cost, the total costs for each program are summed and divided by the total number of commissionees.

$$AC^{OFF,Acc} = \frac{TC^{UNSA} + TC^{NROTC} + TC^{OCS}}{O^{UNSA} + O^{NROTC} + O^{OCS}}$$

This cost is allocated across length of service and designator using continuation rates.

$$AC_{ik}^{OFF,Acc} = \frac{AC^{OFF,Acc}}{EMY_k}$$

This term is then averaged across pay grades based on the inventories of Naval Personnel grouped by grade, LOS, and designator.

3.11.3 Discussion

As with all the indirect cost elements, the first task is to divide the cost data into fixed and variable categories. In general, all costs that can be directly tied to the number of students will be treated as a variable cost. This will include such items as student pay and allowances, scholarships and stipends. Instructor costs and base maintenance expenses will always be treated as fixed and therefore not included in the COMET estimates. While this method presents a fairly straightforward way of separating costs for OCS and NROTC, it does not provide comparable cost estimates for the Academy.

The marginal cost of an Academy graduate is small because of the substantial fixed costs of the Academy itself. This does not, however, represent the true opportunity cost of an Academy education. When a community increases its requirements for Academy graduates, it decreases the number available for other communities. These accessions have to then come from either NROTC or OCS. Thus, while it may appear that communities that acquire a higher percentage of their ensigns from the Academy have lower costs, they actually only have lower marginal costs. Because of the supply constraint, the real total cost that is being imposed on the Navy may be much higher. This cannot be accounted for by looking only at the accounting variable costs. This version of COMET does not account for this additional cost.

USNA data broken down by budget appropriations was received from the USNA Budget Office, (410) 267-4573. The remainder of the information was provided by the Resource Manager of Officer Accessions, (904) 452-4020, at CNET, and was also categorized by budget appropriation.

3.11.4 Notation

$AC^{OFF, Acc}$	Average cost of officer acquisitions
TC^{USNA}	Total cost of the USNA
O^{USNA}	Number of officers commissioned through the USNA
TC^{NROTC}	Total cost of NROTC
O^{NROTC}	Number of officers commissioned through NROTC
TC^{OCS}	Total cost of OCS
O^{OCS}	Number of officers commissioned through OCS
$AC_{ik}^{OFF, Acc}$	Average cost of officer acquisition for LOS i, designator k
EMY_k	Expected manyears for designator k

3.12 ENLISTED RECRUITING

3.12.1 Composition

Enlisted recruiting consists of all variable costs associated with recruiting and processing enlisted personnel into the Navy. These costs can be further broken into direct costs (enlistment bonuses) and variable indirect costs (recruiter support, advertising and processing costs). This section discusses the variable indirect cost component.

The default cost option relies on the all-Navy COAS estimates for enlisted recruiting costs. For applications in which the user wishes to specify a skill-specific quality mix, the model provides two optional approaches to estimating enlisted recruiting costs. Under both options, cross-skill recruiting cost variation depends on the mix of high and low-quality recruits. High quality recruits are defined as high school graduates who score in AFQT categories I-IIIU.

3.12.2 Average Cost Computation

The average cost of recruiting varies by rating for two reasons. First, targeted recruiting incentives such as enlistment bonuses vary by rating. Second, the average cost of recruiting high quality recruits differs from the cost of recruiting lower quality recruits. Each rating has a unique percentage of high quality recruits.

For the first option, costs differing by rating will be calculated based on the variation in quality. The CNRC budget is broken into three main components: (1) recruiter support O&MN, (2) advertising O&MN, and (3) MPN. The cost of a lower quality recruit is assumed to be equal to a processing cost based on the recruiter support O&MN. The remainder of the costs are allocated across high quality recruits only:

$$AC^{REC,H} = \frac{R / S}{L + H} + \frac{ADV + MPN}{H}$$

$$AC^{REC,L} = \frac{R / S}{L + H}$$

This average cost per recruit is then allocated across length of service.

$$AC_k^{REC} = AC^{REC,L} * (1 - \frac{H_k}{E}) + AC^{REC,H} * \frac{H_k}{E}$$

$$AC_{ik}^{REC} = \frac{AC_k^{REC}}{EMY_k}$$

This term is then averaged across pay grades based on the inventories grouped by pay grade, LOS, and rating.

The second option uses these average-cost figures to apply weights to the COAS all-Navy estimates. The model estimates a multiplicative factor that is the ratio of the skill-specific average enlisted recruiting cost to the all-Navy average enlisted recruiting cost. This factor is then applied to the COAS cost. A skill which contains the all-Navy average quality mix receive a factor of 1.0; higher-quality skills have a factor above 1 and lower-quality skills have a factor below 1.

The following equation shows the cost estimation under this option:

$$\text{Rec_Cost}_{COAS,i} = \text{Rec_Cost}_{COAS,AN} * \left[\frac{\frac{H_k}{E_k} * AC^{REC,H} + \left(1 - \frac{H_k}{E_k}\right) * AC^{REC,L}}{\frac{H}{E} * AC^{REC,H} + \left(1 - \frac{H}{E}\right) * AC^{REC,L}} \right]$$

3.12.3 Discussion

The assumption made here is that lower quality recruits are “free” except for a processing cost. The Navy Recruiting Command provided all available data, categorized by budget appropriations. Our point of contact was CDR Roust at (703) 696-5231.

3.12.4 Notation

AC_k^{REC}	Average cost of recruiting a member into rating k
R / S	Total cost of recruiter support
ADV	Total advertising cost of recruiting
MPN	Total MPN cost of recruiting
L	Total number of lower quality recruits, all navy
H	Total number of higher quality recruits, all navy
L_k	Total number of lower quality recruits in rating k
H_k	Total number of higher quality recruits in rating k
E	Total member inventory
E_k	Total member inventory in rating k
$AC^{REC,H}$	Average cost of a high-quality recruit
$AC^{REC,L}$	Average cost of a low-quality recruit
EMY_k	Expected manyears for rating k
AC_{ik}^{REC}	Average cost of recruiting a member into rating k for LOS i

Rec_Cost _{COAS,k}	COAS cost of recruiting a member into rating k
Rec_Cost _{COAS,A}	COAS cost of recruiting a member into the Navy

3.13 ENLISTED TRAINING

3.13.1 Composition

The starting point for training costs for enlisted personnel is established using the COAS methodology. COAS provides one training cost number for enlisted billets; there is no variation by skill or grade. The user has two options for including costs that vary by skill.

The first option is to apply a set of community-specific weights generated from the training data to the COAS estimates. The model estimates multiplicative factor that is the ratio of the skill-specific average training cost to the all-Navy average training cost. This factor is then applied to the COAS cost. This is set default in the model.

The second option allows users to select the average cost method for calculating base training costs. This method provides the user with three levels of training costs. The first is the base training cost. This number includes all training that is common to anyone in that grade in the Navy. The second level contains the costs specific to that rating. The third level allows the user to supplement the base and rating training costs with additional courses located in the BCF training cost database.

Under each scenario, users have the option to add specific courses from the BCF training cost database to any skill. This gives users the ability to construct several billet types for the same rating based on NEC requirements, even when using the all-Navy average as a starting point.

3.13.2 Discussion

CNET provided per-graduate costs for each course broken down by MPN, OMN and SPA (student pay and allowances). Courses are separated into one of the above three categories based on course descriptions, source ratings and subject matter expertise.

All data was received from CNET at

Commanding Officer
Naval Education and Training Program Support Activity
6490 Saufley Field Road
Pensacola, FL 32509-5241

3.14 OFFICER TRAINING

3.14.1 Composition

3.14.2 Discussion

3.15 MEDICAL SUPPORT

3.15.1 Composition

This module consists of all Navy and DoD costs to provide health care to service members and their families. The Navy portion is captured through a COAS coefficient which reflects the observed change in medical personnel levels over time. The DoD costs include the Civilian Health and Medical Program for the Uniformed Services (CHAMPUS), the care provided by the military hospital system, dental care for members and dependents, and additional miscellaneous medical expenses.

3.15.2 Average Cost Computation

DoD health care support costs are broken into two components: (1) the cost of CHAMPUS and (2) the cost of care in the military hospitals:

- CHAMPUS costs vary as a function of family size and age of dependents. Family size tends to vary directly with grade. Average cost, then, is estimated by using the total government cost for CHAMPUS (inpatient and outpatient care) per grade multiplied by the average family size per grade divided by the total inventory for that grade. The retired personnel portion of CHAMPUS is allocated across the active duty inventory:

$$AC_j^{CHAMPUS} = \frac{TC_j^{CHAMP, DEP}}{Dep_j} (AFS_j - 1) + \frac{TC^{CHAMP, RET}}{E}$$

- Military health care support costs are a function of the size and number of military hospitals and the medical force structure. Military medical force structure is sized to provide for an orderly transition to wartime status in the event of mobilization. The medical facilities are intended to provide training to medical personnel filling the force structure. Secondary is the care provided to members and their families. The medical force structure is independent of the size of the current Active Navy End Strength and current personnel compensation issues. Thus, to count this as a manpower cost of the current force is methodologically flawed. Therefore, calculation of average costs does not include the cost of facilities or the military pay of doctors and other medical personnel. The Navy incurs these costs regardless. To

calculate the cost of direct care in the military health care system, the following equation is used:

$$AC_j^{DC} = \frac{TC_j^{MED, MEM}}{E_j} + \frac{TC_j^{MED, DEP}}{Dep_j} * (AFS_j - 1) + \frac{TC^{OTHER}}{E}$$

$$AC_j^{DEN} = \frac{TC_j^{DEN, MEM}}{E_j} + \frac{TC_j^{DEN, DEP}}{Dep_j} * (AFS_j - 1)$$

3.15.3 Discussion

The model does not include a cost for retiree direct care. Retiree direct care is provided on an *as available* basis and therefore utilizes the surplus resource and, hence, does not represent an additional cost. Our contact for the data from the Medical Expense and Performance Reporting System (MEPRS) was LT Thomas G. Mihara at BUMED, (202) 653-0100.

3.15.4 Notation

$AC_j^{CHAMPUS}$	Average CHAMPUS cost per member in grade j
$TC_j^{CHAMP, DEP}$	Total CHAMPUS cost per dependent per grade j
Dep_j	Number of dependents in grade j
AFS_j	Average family size of a member in grade j
$TC^{CHAMP, RET}$	Total CHAMPUS cost for retirees
E_j	Inventory for grade j
AC_j^{DC}	Average cost of direct medical care for military members in grade j
$TC_j^{MED, MEM}$	Total cost of direct medical care for military members in grade j
$TC_j^{MED, DEP}$	Total cost of direct medical care for dependents of members in grade j
TC^{OTHER}	Total cost of other medical services
AC_j^{DEN}	Average cost of direct dental care for military members in grade j
$TC_j^{DEN, MEM}$	Total cost of direct dental care for military members in grade j
$TC_j^{DEN, DEP}$	Total cost of direct dental care for dependents of members in grade j
TC^{OTHER}	Total cost of other medical services

<i>E</i>	Total member inventory
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4.COST ESTIMATING MODEL

This section presents the methodology used to apply the costs displayed in the structured cost database. The model converts cost outlays into a matrix of manpower requirements costs dimensioned by grade and rating. It does this by utilizing several methods to spread out investment costs so that they can be combined with the average costs from the remaining cost elements. These costs are multiplied by the quantities of the manpower requirement and added to the estimate the total costs.

This section is organized in the following manner:

- Section 4.1 provides an overview of the COMET methodology
- Section 4.2 discusses the methodologies used in converting structured costs into annual variable costs
- Section 4.3 contains the information needed to fully understand the Life Cycle Cost module

4.1 OVERVIEW

4.1.1 Purpose of Billet Cost Methodology

The COMET model is a billet costing model. Costs vary according to grade and skill. Using billet costs to estimate manpower costs provides several benefits over traditional by-grade costing. The primary benefit is that it allows analysts to measure the true impact of additional manpower requirements on total Navy costs more accurately. Often, the cost variation of changes in requirements is only captured through the measurement of the direct costs (military compensation, retirement, special pays, etc.). By capturing the variable indirect costs (training, recruiting, etc.), the model reveals the true variation between different skills.

Billet costing also allows hardware/manpower and manpower/manpower tradeoffs to be conducted in a meaningful way. It allows the analyst to measure the cost difference generated by substituting pieces of hardware for skilled labor as well as the costs generated by substituting one type of labor for another.

These types of tradeoff analyses require accurate and consistent estimates of manpower costs. Relative costs often matter more than the absolute costs. Where necessary, COMET has forfeited some accuracy to maintain comparability between skills.

4.1.2 Direct Costs

Direct costs include all costs that sailors receive as pay including retirement pay, bonuses, G.I. Bill and payment of PCS expenses. All of these costs (except for the G.I. Bill) come

from the MPN budget. They apply to all Navy personnel whether they are in a direct or indirect billet. Direct billets are part of the strategic forces, general purpose forces, intelligence and communications communities, airlift personnel, sealift personnel, research and development, supply, and maintenance. Indirect billets are those in acquisition, training, medical support, administrative support, and the individuals account. These costs are weighted by inventories to produce costs that vary by grade and skill. However, the user can choose an all-Navy average for direct costs.

4.1.3 Variable Indirect Costs

Variable indirect costs include all appropriate costs associated with acquiring, training and supporting personnel. It includes the MPN costs of military personnel engaged in these activities. The big problem with including indirect costs is that the category includes both fixed and variable costs. For instance, in officer acquisition, the cost of maintenance on the buildings is relatively fixed (it doesn't vary with the number of commissionees). The costs of books, however, is variable; it varies directly with the number of students. There are also costs that fall in between. For instance, the number of instructors will not change if one fewer student is admitted. However, if 1,000 additional students are admitted, the number of instructors will increase.

It is important to insure that only the variable or "marginal" portion of the indirect costs are included. One tool utilized for this purpose is the Cost of a Sailor (COAS) methodology. COAS is used to estimate the marginal change in indirect costs for each decrease in both the enlisted and officer inventories.

4.2 CONVERTING STRUCTURED COSTS TO ANNUAL VARIABLE COSTS

There are three main tools used to convert the structured costs that underlie the model into the annual variable costs needed to perform the life cycle cost analysis. They are weighting by inventory, amortization and cost of a sailor. Each of these is discussed in the following sections.

4.2.1 Weighting by inventory

The primary method of spreading costs is by weighting the underlying all-Navy costs by grade and skill-specific inventories.

4.2.2 Amortization

Throughout, let CR_i be the probability that an individual in LOS i will complete that year and be observed one year hence in LOS $i+1$ (continuation rate for LOS i). The probability that an individual in year l gets to and completes year n is therefore

$$\prod_{i=1}^n CR_i = 1 * CR_1 * CR_{i+1} * CR_{i+2} * K * CR_n \quad (4.1.0)$$

where 1 = the probability that he or she gets to year 1.

The expected man-years tied to an investment (training for example) made during LOS i is equal to the probability that the trainee survives year i * 1 man-year + the probability that he or she survives year (i + 1) * 1 man-year + probability that he or she survives year (i + 2) * 1 man-year + . . . the probability that he or she survives to year n * 1 man-year:

$$EMY|_{los=i} = CR_i + CR_{i+1} * CR_i + K + \prod_{los=1}^n CR_{los} \quad (4.1.1)$$

This calculation generates the total expected man-years received after a unit investment in LOS i. A training investment of \$A, made in year i, is allocated to each year after the training is incurred as follows:

$$\frac{\$A}{EMY|_{los=i}} \quad (4.1.2)$$

This formula produces a constant training cost per year of service after the training is incurred. Moreover, in the steady-state, the training cost computed for the steady-state inventory equals the training cost necessary to replace a given fiscal year's steady-state losses.

The following is a numerical example of the type of cost this method will produce:

\$A = training cost = \$100
 Accession level (constant) = 100 per year
 Maximum career length = 5 years

Continuation Rate		Cost Allocation	Steady-State Force
LOS 1	.8	\$35.97	80
LOS 2	.9	\$35.97	72
LOS 3	.9	\$35.97	65
LOS 4	.5	\$35.97	32
LOS 5	.9	\$35.97	29

Not including partial years, expected manyears of service is equal to 2.78 per accession (steady state force ÷ accessions ⇒ 278 ÷ 100). Steady-state losses from the model are 100 per year. One-hundred individuals are trained each year at a cost of \$100 each, or \$10,000. Multiplying the allocated training cost of \$35.97 per year by the steady-state end-strength of 278 results in total annual training costs of \$10,000 per year.

4.2.3 Cost of a Sailor (COAS)

The Cost of a Sailor methodology is used to estimate the marginal portion of the indirect costs. It is done by first identifying the indirect billets that provide personnel support to other billets. These include billets associated with acquiring, training, locating and supporting Navy military personnel. The number of indirect billets was then regressed on the endstrength of the Navy over the past 18 years to produce the COAS coefficients. A similar analysis was performed with OMN dollars and endstrength. These coefficients are then multiplied by the Composite Standard rate to get costs.

4.3 INCORPORATING BILLET COSTS INTO LCC ANALYSIS

This section discusses how the COMET Life Cycle Cost Model (LCCM) proceeds from the Structured Cost Database to estimate the cost of manpower requirements over time. This process is the cost estimation portion of the model. It integrates the the direct and variable indirect costs and estimates the cost of manpower using the following steps:

- Specified “joint” costs from the structured database, such as recruiting, initial training, and SRB costs are amortized. These amortized costs are integrated back into the structured cost database, and then all costs are totaled across appropriation. This process creates an output file containing summarized cost data by appropriation and grade for each rating.
- The user specifies the number of units required over the analysis horizon (up to 99 years). Each unit is denominated by rating and grade.
- The number of manpower requirements is multiplied by the cost-per-position for each skill and pay grade. The costs are then added over grade and skill to obtain a cost-per-fiscal year, and the costs—both discounted and undiscounted—are summed over time.
- The output is then displayed by rating for each appropriation. It can also be printed or exported to a separate file.

APPENDIX A: DATA SOURCES

The sections of this appendix present the data sources for each variable used in the policy modules.

A.1 MILITARY COMPENSATION

Variable	Definition	Data Source
bp	basic pay by grade and LOS	Pay Tables
bq1	BAQ w/dependents	Pay Tables
bq2	BAQ w/o dependents	Pay Tables
bq3	partial BAQ w/o dependents	Pay Tables
bas	basic allowance for subsistence	Pay Tables
inv	inventory	DMDC
vha	variable housing allowance	DMDC
w_dep%	% drawing w/dependents	MPN J-Book
m_cash	% w/dep receiving BAQ in cash	MPN J-Book
s_cash	% w/o dep receiving BAQ in cash	MPN J-Book
fract_vha	% receiving VHA in cash	MPN J-Book

A.2 ENLISTMENT BONUSES

Variable	Definition	Data Source
h	number of high quality recruits	NREC
l	number of low quality recruits	NREC
b	measure of pay for supply elasticity	Calculated
se	supply elasticity	Assumed = 1
eb	enlistment bonus	N130D2

A.3 SELECTIVE REENLISTMENT BONUS

Variable	Definition	Data Source
inv	inventory by grade	DMDC
tc_srb	total cost of SRB by rating	Pers 20

A.4 PERMANENT CHANGE OF STATION

Variable	Definition	Data Source
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weight	weight allowance by grade	Joint Travel Reg
dep	% of members with dependents by grade	DMDC
percent	% of E4s with LOS 2 years	Calculated
sep	total cost of separation moves	MPN J-Book
tng	total cost of training moves	MPN J-Book
rots	total cost of rotational moves	MPN J-Book
ops	total cost of operational moves	MPN J-Book
acc	total cost of accession moves	MPN J-Book
oconus	percentage of member OCONUS	JUMPS FY97
tc	tour length in CONUS	Calculated
toc	tour length in OCONUS	Assumed = 3
loss	% members separating by grade	Calculated

A.5 SEPARATION COSTS

Variable	Definition	Data Source
aml	average accrued monthly leave	MPN J-Book
bp	base pay	Pay Tables
cr	continuation rates	Skipper
sev	total cost of sev/disability pay	MPN J-Book

A.6 RETIRED PAY ACCRUAL

Variable	Definition	Data Source
inv	inventory	DMDC
bp	base pay	Pay Tables
r_act	DoD actuary rpa factor	MPN J-Book

A.7 SPECIAL PAYS

Variable	Definition	Data Source
flight	# in rating receiving flight pay	JUMPS FY97
flight_pay	amount of flight pay	Pay Tables
hazard	# in rating receiving hazardous duty	JUMPS FY97
hazard_pay	amount of hazardous duty pay	Pay Tables
dive	# in rating receiving diving pay	JUMPS FY97
dive_pay	amount of diving pay	Pay Tables
hostile	# in rating receiving hostile fire pay	JUMPS FY97
hostile_pay	amount of hostile fire pay	MPN J-Book
sub	# in rating receiving sub pay	JUMPS FY97
sub_pay	amount of sub pay	Pay Tables
lang	# in rating receiving foreign lang proficiency pay	JUMPS FY97

lang_pay	amount of foreign language proficiency pay	Pay Tables
sduty	# in rating receiving special duty pay	JUMPS FY97
sduty_pay	amount of special duty pay	Pay Tables
places	# in rating receiving certain places pay	JUMPS FY97
places_pay	amount of certain places pay	Pay Tables
sea	# in rating receiving sea pay	JUMPS FY97
sea_pay	amount of sea pay	Pay Tables
oha	# in rating receiving overseas housing allowance	JUMPS FY97
oha_pay	amount of overseas housing allowance	Pay Tables
fsa	# in rating receiving family separation allowance	JUMPS FY97
fsa_pay	amount of family separation allowance	Pay Tables
nuclear	# in rating receiving nuclear pay	JUMPS FY97
nuclear_pay	amount of nuclear pay	Pay Tables
medc	# in rating receiving medical corps pay	JUMPS FY97
medc_pay	amount of medical corps pay	Pay Tables
denc	# in rating receiving dental corps pay	JUMPS FY97
denc_pay	amount of dental corps pay	Pay Tables
medsc	# in rating receiving medical service corps pay	JUMPS FY97
medsc_pay	amount of medical service corps pay	Pay Tables
board	# in rating receiving board certified pay	JUMPS FY97
board	amount of board certified pay	Pay Tables

A.8 INCENTIVE PAYS

Variable	Definition	Data Source
nuclear	amount of nuclear incentive pay	Pay Tables
aviation	amount of aviation incentive pay	Pay Tables
medical	amount of medical incentive pay	Pay Tables
multiyear	amount of multiyear medical pay	Pay Tables
rn_anesth	amount of certified RN anesthesiologist pay	Pay Tables

A.9 OTHER BENEFITS

Variable	Definition	Data Source
surv_ben	total cost of survivor benefits	MPN J-Book
app_des	total cost of apprehension of deserters	MPN J-Book
adop	total cost of adoption expenses	MPN J-Book
dth_grt	total cost of death gratuities	MPN J-Book
unempl	total cost of unemployment comp	MPN J-Book
cloth_1	basic clothing allowance	Pay Tables
cloth_2	standard clothing allowance	Pay Tables

cloth_3	special clothing allowance	Pay Tables
fica	FICA percentage for base year	Soc Sec Admin
ficalimit	maximum pay that is taxed	Soc Sec Admin
bp	base pay	Pay Tables

A.10 GI BILL

Variable	Definition	Data Source
cont	amount of member's contribution	Almanac
benefit	amount of member's benefit	Almanac
r	discount rate	OMB circ A-94
usage	usage rate	Dept of Veteran's Affairs

A.11 OFFICER ACQUISITION

Variable	Definition	Data Source
USNA	total cost of the USNA	USNA
off_USNA	USNA commissionees	USNA
NROTC	total cost of NROTC program	CNET
off_NROTC	NROTC commissionees	CNET
OCS	total cost of OCS program	CNET
off_OCS	OCS commissionees	CNET

A.12 ENLISTED RECRUITING

Variable	Definition	Data Source
h	number of high quality recruits	NREC
l	number of low quality recruits	NREC
adv	total NREC advertising costs	NREC
r/s	total NREC recruiter support costs	NREC
mpn	total NREC MPN costs	NREC
COAS	COAS estimate of recruiting costs	NCCA

A.13 MEDICAL SUPPORT

Variable	Definition	Data Source
chmp_dep	total CHAMPUS costs for dep	BUMED
med_mem	total medical costs for members	BUMED
med_dep	total medical costs for dep	BUMED
den_mem	total dental costs for members	BUMED
den_dep	total dental costs for dep	BUMED

chmp_ret	total CHAMPUS costs for retirees	BUMED
other	total cost of other medical services	BUMED
dep	number of dependents	DMDC
afs	average family size	DMDC

APPENDIX B: SKILL IDENTIFIERS

B.1 ENLISTED PERSONNEL

AB	Aviation Boatswain's Mate
ABE	Aviation BM - Launching and Recovery
ABF	Aviation BM - Fuels
ABH	Aviation BM - Aircraft Handling
AC	Air Traffic Controller
AD	Aviation Machinist's Mate
AE	Aviation Electrician's Mate
AF	Aviation Maintenceman (Comp Rating)
AG	Aerographer's Mate
AK	Aviation Storekeeper
AM	Aviation Structural Mechanic
AME	Aviation Struct Mech - Safety Equip
AMH	Aviation Struct Mech - Hydr Mech
AMS	Aviation Struct Mech - Structures
AO	Aviation Ordnanceman
AS	Aviation Support Equipment Technician
AT	Aviation Electronics Technician
AV	Aviation Avionics Technician (Comp Rating)
AW	Aviation ASW Operator
AZ	Aviation Maintenance Administrationman
BM	Boatswain's Mate
BT	Boilerman
BU	Builder
CE	Construction Electrician
CM	Construction Mechanic
CTA	Cryptologic Technician (Administrative)
CTI	Cryptologic Technician (Interpretative)
CTM	Cryptologic Technician (Maintenance)
CTO	Cryptologic Technician (Communications)
CTR	Cryptologic Technician (Collection)
CTT	Cryptologic Technician (Technical)

CU	Constructionman (Comp Rating)
DC	Damage Control
DIV	Diver (EMC)
DK	Disbursing Clerk
DM	Illustrator Draftsman
DP	Data Processing Technician
DS	Data Systems Technician
DT	Dental Technician
EA	Engineering Aid
EM	Electrician's Mate
EMNUCSS	Electrician's Mate Sub Nuc (EMC)
EMNUCSW	Electrician's Mate Surf Nuc (EMC)
EMSW	Electrician's Mate Surf (EMC)
EN	Engineman
ENAUXX	Engineman, Auxiliaries (EMC)
ENMN	Engineman, Main Propulsion (EMC)
EO	Equipment Operator
EOD	Explosive Ordnance Disposal
EQ	Equipmentman (Comp Rating)
ET	Electronics Technician
ETNUCSS	Electronics Technician, Sub Nuc (EMC)
ETNUCSW	Electronics Technician, Surf Nuc (EMC)
ETSS	Electronics Technician, Sub (EMC)
ETSW	Electronics Technician, Surf (EMC)
EW	Electronic Warfare Technician
FC	Fire Controlman
FT	Fire Control Technician (Comp Rating)
FTG	Fire Control Tech - Gun
GM	Gunner's Mate
GMG	Gunner's Mate - Guns
GMM	Gunner's Mate - Missile
GS	Gas Turbine Systems Technician
GSE	Gas Turbine - Electrical
GSM	Gas Turbine - Mechanical
HM	Hospital Corpsman
HMDIV	Medical Deep Sea Dive Tech (EMC)
HMNUC	Nuclear Medicine Tech (EMC)
HMSEAL	Special Operations Tech (EMC)
HMSUB	Independent Duty Corpsman, Sub (EMC)
HMSURF	Independent Duty Corpsman, Surf (EMC)

HT	Hull Maintenance Technician
IC	Interior Comm Electrician
ICSS	Interior Comm Electrician, Sub (EMC)
IM	Instrumentman
IS	Intelligence Specialist
JO	Journalist
LI	Lithographer
LN	Legalman
MA	Master-At-Arms
ML	Molder
MM	Machinist's Mate
MMNUCSS	Machinist's Mate, Sub Nuc (EMC)
MMNUCSW	Machinist's Mate, Surf Nuc (EMC)
MMSS	Machinist's Mate, Sub (EMC)
MN	Mineman
MR	Machinery Repairman
MS	Mess Management Specialist
MSSS	Mess Management Specialist, Sub (EMC)
MT	Missile Technician
MU	Musician
NC	Navy Counselor
OM	Opticalman
OS	Operations Specialist
OT	Ocean Systems Technician (Comp Rating)
OTA	Ocean Systems Technician, Anal
OTM	Ocean Systems Technician, Maint
PC	Postal Clerk
PH	Photographer's Mate
PM	Patternmaker
PN	Personnelman
PR	Aircrew Survival Equipmentman
QM	Quartermaster
QMSS	Quartermaster, Sub (EMC)
RM	Radioman
RMSS	Radioman, Sub (EMC)
RP	Religious Program
SEAL	Seal, Special Warfare (EMC)
SH	Ship's Serviceman
SK	Storekeeper
SKSS	Storekeeper, Sub (EMC)

SM	Signalman
STG	Sonar Technician - Surface
STS	Sonar Technician - Submarine
SW	Steelworker
TM	Torpedoman's Mate
TMSS	Torpedoman's Mate, Sub (EMC)
UT	Utilitiesman
WT	Weapons Control Technician
YN	Yeoman
YNSS	Yeoman, Sub (EMC)

B.2 OFFICERS

110X	General unrestricted line officer
111X	Line officer qualified in Surface Warfare
112X	Line officer qualified in Submarine Warfare
113X	Line officer qualified in Special Warfare
114X	Line officer qualified in Special Operations
131X	Line officer Aviation Pilot
132X	Line officer Aviation NFO
144X	Engineering Duty officer
151X	Aeronautical EDO (Aeronautical Engineering)
152X	Aeronautical EDO (Aviation Maintenance)
161X	Special Duty officer (Cryptology)
163X	Special Duty officer (Intelligence)
165X	Special Duty officer (Public Affairs)
180X	Special Duty officer (Oceanography)
210X	Medical Corps officer
220X	Dental Corps officer
230X	Medical Service Corps officer
250X	Judge Advocate General's Corps officer
290X	Nurse Corps officer
310X	Supply Corps officer
410X	Chaplain Corps officer
510X	Civil Engineer Corps officer
600X	Limited Duty officer

